APIS MELLIFERA, AN UNUSUAL PREY FOR A PAPER WASP, *POLISTES MAJOR CASTANEICOLOR* (HYMENOPTERA)[1]

Patricia J. Schmidt[2], Justin O. Schmidt[2,3]

ABSTRACT: A foraging paper wasp, *Polistes major castaneicolor*, was observed to prey on a honey bee, *Apis mellifera*.

While collecting insects from a flowering western soapberry tree (*Sapindus saponaria drummondii*) located eight km northwest of the town of Patagonia in Santa Cruz County, Arizona, we observed a paper wasp, *Polistes major castaneicolor* Bequaert, feeding on a freshly captured worker honey bee, *Apis mellifera* L. The wasp captured the bee from on or near an inflorescence at 11:25 a.m. 22 June, 1985. The wasp then slowly descended with it to a dry patch of bare ground several meters from the tree, and proceeded to dismember and feed upon it. During the five minute struggle, the bee continued moving and repeatedly extruded and retracted its sting. Despite difficulty in subduing the prey, the wasp never exposed its sting or moved its gaster in the direction of the bee. After five minutes, a single ant forager of *Aphaenogaster* (=*Novomessor*) *albisetosus* Mayr discovered the pair and quickly, but unsuccessfully, attacked. The ant returned within seconds and attacked the wasp again; this time the wasp took flight with its prey. At this point we captured the pair.

The wasp was obtaining both sugars and meat from the bee. This was clear from behavioral observations of the attack and from measurements of the ice chilled pair. The fresh remains of the honey bee weighed 44 mg, about half as much as a normal unladen forager (80-110 mg). The wasp, which lacked any wear on its wings or mandibles, weighed 200 mg. Microscopic investigation revealed that both right wings and the right meso- and metathoracic legs of the bee were removed as well as substantial portions of flight muscle and the muscles above the coxal areas. The abdomen also had a large opening in the right second and third segments of the gaster at the interface of the terga and sterna (Figure 1). We could easily see that all of those segments including the crop had been removed.

Although vespine wasps were well known for preying on *Apis* (Matsuura

[1]Received August 25, 1985, Accepted December 2, 1985.

[2]Department of Entomology, University of Arizona, Tucson, Arizona, 85721.

[3]Carl Hayden Bee Research Center, USDA, Agricultural Research Service, 2000 E. Allen Road, Tucson, Arizona, 85719.

and Sakagami, 1973), this is apparently the first report of *Polistes* preying on honey bees. During numerous collecting periods over several years we had observed that both *P. major castaneicolor* and *A. mellifera* were abundant among foragers on flowers of the *Sapindus*; yet this was the only time we observed wasp predation on a bee. We do not know the exact circumstances leading to the capture, but note that until about the last hundred years, the two species did not occur together. Moreover, we do not know if this particular observation just represents an unusual occurrence or if it represents an expansion of prey types by this slow predator. Certainly *Apis mellifera* could represent a new, slowly moving food source for *P. m. castaneicolor.*

The wasp and honey bee are deposited in the collection of the Entomology Department of the University of Arizona as permanent vouchers.

Figure 1. Honey bee prey of *Polistes*. Arrows point to holes chewed into the gaster and thorax through which the honey crop and flight muscles were removed.

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LITERATURE CITED

Matsuura, M. and S.F. Sakagami. 1973. A bionomic sketch of the giant hornet, *Vespa mandarinia*, a serious pest for Japanese apiculture. J. Fac. Sci. Hokkaido Univ. 19: 125-162.

BOOK REVIEW

INSECT ECOLOGY, second edition, Peter W. Price. 1984. John Wiley & Sons, New York, NY, 607 pp., $37.50

Ecologists in general, and insect ecologists in particular, are fortunate to have an updated edition of this very valuable textbook on insect ecology available to them. Although the organismic emphasis is on insects, general ecological principles in the broad areas of (1) trophic relationships, (2) populations, and (3) communities and distributions are covered. The text is rich in material and many references that can be used on the advanced undergraduate level. The number of references, in fact, has been almost doubled in the second edition.

Price has brought together and summarized much important information originally published by Whittaker, Ehrlich and Raven, Janzen, Pianka, and other well-known ecologists. His writing is clear and the material is presented in a step-by-step fashion which is easy to follow and understand. Many tables, figures, and black-and-white diagrams complement the text.

In Chapter 2, Size and Scaling in Moderately Small Organisms, Price discusses insect flight and ecological success. It is pointed out, for example, that for insects that fly, running is much more "expensive" than is flying. Most insects are small, and flight is a much more efficient use of energy for locomotion than is running.

Price also discusses plant and insect herbivore relationships, and the coevolutionary process that has been going on between these two taxa for millions of years. Much up-to-date information on chemical ecology is included in this discussion and the entomologist who may feel somewhat inadequate in this area would do well to read Chapter 3.

Many other relevant topics, important to insect ecology and/or general ecology, are covered in the text. Especially worthy of note are chapters on predator and prey interactions, parasite and host interactions, pollination ecology, ecological genetics, behavioral ecology, niche concept and division of resources, and diversity and stability.

In addition to the excellent bibliography, the volume contains a taxonomic index, author index, and subject index. The latter may be somewhat incomplete since I found that a number of items presented in the text were not included in the index. None-the-less, Insect Ecology is an outstanding textbook for an undergraduate insect ecology course, and it is also a valuable reference for all entomologists and ecologists.

Paul P. Shubeck,
Biology Department, Montclair State College, Upper Montclair, NJ